

- 36 -

**APPARATUS AND METHODS FOR MEASURING SURFACE PROFILES
AND WAVEFRONT ABERRATIONS, AND LENS SYSTEMS COMPRISING
SAME**

5

Abstract of the Disclosure

Apparatus and methods are disclosed for measuring a surface profile and/or a wavefront aberration of a target object. Exemplary target objects include mirrors,
10 lenses, and lens systems. A representative apparatus configuration includes a light source, a light-flux optical system, a phase-state changing device, a detector, and a computer. The light-flux optical system (i) produces, from a light flux produced by the light source, measurement-light and reference-light fluxes, (ii) directs the measurement-light flux to the target object, (iii) provides the reference-light flux
15 with a standard wavefront, and (iv) establishes interference between the two light fluxes. The phase-state changing device changes a phase state of the reference-light flux and/or the measurement-light flux relative to a respective standard. The detector detects interference fringes. The computer produces, from the detected interference fringes produced at different respective phase states, data concerning
20 respective phase distributions, and calculates an average phase distribution. The average phase distribution, obtained using data from multiple phase states, substantially reduces the effects of reflected-light noise.